

**I CLAIM:**

1. A method of determining a turbine shaft speed of a gas turbine engine, the engine having a turbine shaft drivingly connected to an alternator, the alternator adapted to generate electricity for a first purpose, said method comprising:  
  
receiving a rotation frequency signal from the alternator; and  
  
determining said gas turbine shaft speed using said signal.
2. The method of claim 1, wherein said signal is derived from said generated electricity and the method further comprises conditioning said signal to extract a rotation frequency component therefrom.
3. The method of claim 1, wherein said determining said gas turbine shaft speed further comprises using a ratio representative of a relationship between rotation of said gas turbine shaft and said rotation frequency signal.
4. The method of claim 3, wherein said ratio comprises at least one of a gearing ratio between the gas turbine and alternator shafts and a ratio of alternator generated electrical signal cycles per revolution of the alternator.
5. The method of claim 2, wherein voltage is used to determine the rotation frequency component.

6. An apparatus for determining a speed of a turbine shaft of a gas turbine engine, said apparatus comprising:  
  
input means for receiving a rotation signal from an alternator driven by the turbine shaft, the alternator adapted to generate electricity for a first purpose; and  
  
a processing unit for determining said gas turbine shaft speed using said signal.
7. The apparatus of claim 6, wherein said signal comprises an alternator rotation frequency component and the apparatus further comprises a signal conditioning unit for extracting the frequency component from said signal.
8. The apparatus of claim 7, further comprising a ratio adjustment unit for storing a relationship ratio between a rotation speed of the turbine shaft said frequency component.
9. The apparatus of claim 8, wherein relationship ratio comprises at least one of a gear ratio between the turbine shaft and an alternator shaft and a frequency ratio between rotation of the alternator and number of AC cycles produced per alternator revolution.
10. The apparatus of claim 6, wherein said signal comprises an alternator voltage signal and the apparatus further comprises a signal conditioning unit for extracting the frequency component from said signal.

11. A method of operating a gas turbine engine, the engine having a turbine shaft drivingly connected to a permanent magnet alternator, the method comprising the steps of:  
  
operating the engine to rotate the turbine shaft and thereby rotate the alternator;  
  
extracting generated electricity from the alternator to thereby provide operational electrical power to at least a first piece of equipment;  
  
extracting from the generated electricity a frequency indicative of alternator rotation speed;  
  
determining a rotation speed of the turbine shaft using said frequency; and  
  
providing the determined rotation speed to an engine controller for use in controlling operation of the gas turbine engine.
12. A method according to claim 12 wherein the first piece of equipment is the engine controller.
13. A method according to claim 12 wherein the frequency is a voltage frequency.